

FORM PTO-1390 (Modified)  
(REV 11-98)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

## TRANSMITTAL LETTER TO THE UNITED STATES

203517US2PCT

DESIGNATED/ELECTED OFFICE (DO/EO/US)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

CONCERNING A FILING UNDER 35 U.S.C. 371

09/786744

INTERNATIONAL APPLICATION NO.

PCT/SE99/01561

INTERNATIONAL FILING DATE

08 September 1999

PRIORITY DATE CLAIMED

11 September 1998

TITLE OF INVENTION

IMPROVEMENTS IN, OR RELATING TO, TRANSMISSION SYSTEMS

APPLICANT(S) FOR DO/EO/US

Martin HAMMARSTROM, et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

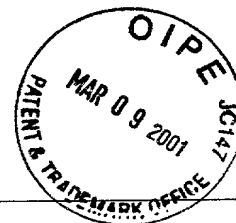
## Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

Request for Consideration of Documents Cited in International Search Report

Notice of Priority

PCT/IB/308



U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.53) <b>09/7786744</b>		INTERNATIONAL APPLICATION NO. <b>PCT/SE99/01561</b>		ATTORNEY'S DOCKET NUMBER <b>203517US2PCT</b>	
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21. The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :</b> <input checked="" type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... <b>\$1,000.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$860.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... <b>\$710.00</b> <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$690.00</b> <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$100.00</b> <div style="text-align: right;"><b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b></div>				<b>CALCULATIONS PTO USE ONLY</b>	
				<b>\$1,000.00</b>	
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).				<b>\$130.00</b>	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	20 - 20 =	0	x \$18.00	<b>\$0.00</b>	
Independent claims	3 - 3 =	0	x \$80.00	<b>\$0.00</b>	
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>				<b>\$0.00</b>	
<b>TOTAL OF ABOVE CALCULATIONS =</b>				<b>\$1,130.00</b>	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable). <input type="checkbox"/>				<b>\$0.00</b>	
<b>SUBTOTAL =</b>				<b>\$1,130.00</b>	
Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).				<b>\$0.00</b>	
<b>TOTAL NATIONAL FEE =</b>				<b>\$1,130.00</b>	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/>				<b>\$0.00</b>	
<b>TOTAL FEES ENCLOSED =</b>				<b>\$1,130.00</b>	
				<b>Amount to be: refunded</b>	<b>\$</b>
				<b>charged</b>	<b>\$</b>


☒ A check in the amount of **\$1,130.00** to cover the above fees is enclosed.

☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \_\_\_\_\_ to cover the above fees.  
A duplicate copy of this sheet is enclosed.

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **15-0030** A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:



**22850**

**Surinder Sachar**  
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REGISTRATION NUMBER

March 9 2001  
DATE

203517US-2867-2867-2 PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF:

:

MARTIN HAMMARSTROM ET AL

: ATTN: APPLICATION DIVISION

SERIAL NO: NEW U.S. PCT APPLICATION:

(Based on PCT/SE99/01561)

FILED: HEREWITH

: EXAMINER:

FOR: IMPROVEMENTS IN, OR

:

RELATING TO, TRANSMISSION  
SYSTEMS

PRELIMINARY AMENDMENT

ASSISTANT COMMISSIONER FOR PATENTS

WASHINGTON, D.C. 20231

SIR:

Prior to a first examination on the merits, please amend the above-identified  
application as follows:

IN THE TITLE

Please amend the title to read:

--A TRANSMISSION SYSTEM, A METHOD AND AN APPARATUS

PROVIDING ACCESS FOR IP DATA PACKETS TO A

FIREWALL PROTECTED NETWORK--.

09786744-082001

## IN THE CLAIMS

Please amend the claims as follows:

--3. (Amended) A transmission system, as claimed in claim 1, characterised in that said firewall is adapted to be transparent to IP-communication through the firewall from the inside to the outside thereof, and, for a limited period of time, open to IP-communication through the firewall from the outside to the inside thereof.

4. (Amended) A transmission system, as claimed in claim 1, characterised in that said first IC-breaker (IC-BREAKER 1) is adapted, on receipt of an IP data packet, to store said IP data packet and send said stored IP data packet through the open firewall to the second IC-breaker (IC-BREAKER 2), when the firewall has been the opened.

5. (Amended) A transmission system, as claimed in claim 1, characterised in that said second IC-breaker (IC-BREAKER 2) is adapted to identify the size of a Ping IP-packet received from a sender in the form of a IC-breaker said size being indicative of the type of packet, which has been received and the port via which it was received.

6. (Amended) A transmission system, as claimed in claim 1, characterised in that said protected network is a Local Area Network (LAN).

7. (Amended) A transmission system, as claimed in claim 1, characterised in that said system is an Asynchronous Transfer Mode (ATM) transmission system, adapted for the transmission of IP data packets, using ATM as a carrier network.

11. (Amended) A method, as claimed in claim 8, characterised in that said protected network is a Local Area Network (LAN).

12. (Amended) A method, as claimed in claim 8, characterised in that said system is an Asynchronous Transfer Mode (ATM) transmission system, adapted for the transmission of IP data packets, using ATM as a carrier network.

15. (Amended) Apparatus, as claimed in claim 13, characterised in that the IC-breaker (IC-BREAKER 2), located on the protected network side of the firewall is adapted to:

- identify the size of a Ping IP-packet, received from a sender in the form of a IC-breaker, located outside the firewall, said size being indicative of the type of packet which has been received and the port via which it was received;
- return the Ping IP-packet to the sender, which opens the firewall for a limited period of time;
- await receipt, from the sender, of said IP data packet for the protected network during said limited period of time said firewall is open; and
- send the received IP data packets to the protected network.

17. (Amended) An IC-breaker adapted for use with apparatus as claimed in claim 13, characterised in that said IC-breaker includes means for transmitting PING packets to an IC-breaker, located behind a firewall, means for storing a received IP packets, means for detecting receipt of said IP packets from within said firewall, and means, operative in response to receipt of IP packets to transmit stored IP packets.

18. (Amended) An IC-breaker adapted for use with apparatus as claimed in claim 13, characterised in that said IC-breaker includes means for identifying a received PING packet and determining an associated IP packet type therefrom, means for transmitting an IP packets of said associated IP packet type through the firewall, means for receiving an IP packet transmitted through said firewall, and means for distributing said IP packet to a predetermined address.

19. (Amended) A transmission system, adapted for the transmission of IP data packets, said system including an IP-network (LAN) protected by a firewall, characterised in that said system includes an apparatus as claimed in claim 13.

20. (Amended) A communications system including a transmission system as claimed in claim 1.--

REMARKS

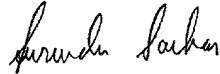
Favorable consideration of this application, as presently amended, is respectfully requested.

The present preliminary amendment is submitted to place the above-identified application in more proper format under United States practice. By the present preliminary amendment the title has been amended to be consistent with that in the PCT publication sheet. The claims have also been amended to no longer recite any improper multiple dependencies.

The present application is believed to be in condition for a full and thorough examination on the merits. An early and favorable consideration of the present application is hereby respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.



Gregory J. Maier  
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Serial No: \_\_\_\_\_

Amendment Filed on: \_\_\_\_\_

--3. (Amended) A transmission system, as claimed in claim 1 [or claim 2], characterised in that said firewall is adapted to be transparent to IP-communication through the firewall from the inside to the outside thereof, and, for a limited period of time, open to IP-communication through the firewall from the outside to the inside thereof.

4. (Amended) A transmission system, as claimed in [any preceding] claim 1, characterised in that said first IC-breaker (IC-BREAKER 1) is adapted, on receipt of an IP data packet, to store said IP data packet and send said stored IP data packet through the open firewall to the second IC-breaker (IC-BREAKER 2), when the firewall has been the opened.

5. (Amended) A transmission system, as claimed in [any preceding] claim 1, characterised in that said second IC-breaker (IC-BREAKER 2) is adapted to identify the size of a Ping IP-packet received from a sender in the form of a IC-breaker said size being indicative of the type of packet, which has been received and the port via which it was received.

6. (Amended) A transmission system, as claimed in [any preceding] claim 1, characterised in that said protected network is a Local Area Network (LAN).

7. (Amended) A transmission system, as claimed in [any preceding] claim 1, characterised in that said system is an Asynchronous Transfer Mode (ATM) transmission system, adapted for the transmission of IP data packets, using ATM as a carrier network.



11. (Amended) A method, as claimed in [any of claims 8 to 10] claim 8, characterised in that said protected network is a Local Area Network (LAN).

12. (Amended) A method, as claimed in [any of claims 8 to 11] claim 8, characterised in that said system is an Asynchronous Transfer Mode (ATM) transmission system, adapted for the transmission of IP data packets, using ATM as a carrier network.

15. (Amended) Apparatus, as claimed in [either] claim 13, [or claim 14,] characterised in that the IC-breaker (IC-BREAKER 2), located on the protected network side of the firewall is adapted to:

- identify the size of a Ping IP-packet, received from a sender in the form of a IC-breaker, located outside the firewall, said size being indicative of the type of packet which has been received and the port via which it was received;
- return the Ping IP-packet to the sender, which opens the firewall for a limited period of time;
- await receipt, from the sender, of said IP data packet for the protected network during said limited period of time said firewall is open; and
- send the received IP data packets to the protected network.

17. (Amended) An IC-breaker adapted for use with apparatus as claimed in [any of claims 13 to 16] claim 13, characterised in that said IC-breaker includes means for transmitting PING packets to an IC-breaker, located behind a firewall, means for storing a received IP packets, means for detecting receipt of said IP packets from within said firewall, and means, operative in response to receipt of IP packets to transmit stored IP packets.

18. (Amended) An IC-breaker adapted for use with apparatus as claimed in [any of claims 13 to 16] claim 13, characterised in that said IC-breaker includes means for identifying a received PING packet and determining an associated IP packet type therefrom, means for transmitting an IP packets of said associated IP packet type therefrom,

means for transmitting an IP packets of said associated IP packet type through the firewall, means for receiving an IP packet transmitted through said firewall, and means for distributing said IP packet to a predetermined address.

19. (Amended) A transmission system, adapted for the transmission of IP data packets, said system including an IP-network (LAN) protected by a firewall, characterised in that said system includes an apparatus as claimed in [any of claims 13 to 16] claim 13.

20. (Amended) A communications system including a transmission system as claimed in [any of claims 1 to 7 or claim 19,] claim 1 [or operating in accordance with a method as claimed in any of claims 8 to 12].--

## TRANSMISSION SYSTEM ADAPTED FOR IP DATA PACKETS

The invention relates to transmission systems which are adapted for the transmission of IP (Internet Protocol) data packets through a firewall, the system including means adapted to temporarily open the firewall to enable IP data packets to be transmitted therethrough, a method for the transmission of IP data packets to a system inside a firewall, apparatus for providing access to a firewall protected network, and a communications system including the transmission system of the present invention, or operating in accordance with the method of the present invention.

It is known to use a firewall and other equipment to block incoming traffic, such as, IP (Internet Protocol) data packets, but the problem with a firewall and other equipment designed to block incoming data packets, is that it can be very difficult to remotely control systems which are inside the firewall.

When an attempt is made by a computer to contact another computer, difficulties are sometimes experienced in obtaining a reply from the computer. In these circumstances, it is possible to use a Ping service to determine whether, or not, the computer is connected to the network. In operation, the Ping service sends a message, in the form of a data packet, to the computer, with which contact is required, and when the computer receives the data packet it sends it back to the sender. If the data packet is not returned, then the sender will be aware that the computer is not connected to the network. In Windows, the Ping service can be run from DOS.

It is an object of the present invention to provide a transmission system, adapted for the transmission of IP (Internet Protocol) data packets through a firewall, the system including means adapted to temporarily open the firewall to enable IP data packets to be transmitted therethrough. The firewall opening means are provided by two IC-breakers, one of which is located on one side of the firewall and

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the other one of which is located on the other side of the firewall. An IC-breaker is a function that can be either included in an application, or be a separate entity.

It is another object of the present invention to provide a method for the transmission of IP data packets to a system inside a firewall.

It is another object of the present invention to provide apparatus for providing access to a firewall protected network and a transmission system including such an apparatus.

It is another object of the present invention to provide IC-breakers adapted for use with apparatus of the present invention.

It is another object of the present invention to provide a communications system including the transmission system of the present invention, or operating in accordance with the method of the present invention.

According to a first aspect of the present invention, there is provided, a transmission system, adapted for the transmission of IP data packets, said system including an IP-network and a network protected by a firewall, said firewall being adapted to block incoming traffic to the protected network, characterised in that said system further includes means for temporarily opening the firewall to enable IP data packets to be transmitted through the firewall to the protected network.

The firewall may be adapted to be transparent to Ping (ICMP)-packets; IP-traffic passing through the firewall from the inside thereof to the outside thereof; and, for a limited period of time, IP-traffic, similar to that which is sent from the inside of the firewall to the outside of the firewall, passing through the firewall from the outside thereof to the inside thereof.

The means for temporarily opening the firewall may include first and second

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IC-breakers, located on opposite sides of said firewall, and said IC-breakers may have a structure and functionality dictated by the manner in which said firewall is adapted to operate.

5           The first IC-breaker may be adapted, on receipt of an IP data packet, to store said IP data packet; send a Ping IP-packet to the second IC-breaker through the firewall; await receipt of a returned Ping IP-packet from the second IC-breaker, said IP- packet opening the firewall for a short period of time; and send said stored IP data packet through the open firewall to the second IC-breaker.

10           The second IC-breaker may be adapted to identify the size of a Ping IP-packet received from a sender located outside of the firewall, said size being indicative of the type of packet which has been received and the port via which it was received; return the Ping IP-packet to the sender, which opens the firewall for a limited period of time; await receipt, from the sender, of an IP data packet for the protected network, during said limited period of time said firewall is open; and send the received IP data packet to the protected network.

15           The first IC-breaker may be located on the IP-network side of the firewall, in which case, said second IC-breaker is located on the protected network side of the firewall. The first IC-breaker may be adapted to receive IP data packets from IP-network equipments that are destined for the protected network. The IC-breakers may be adapted, on receipt, by said first IC-breaker, of a IP data packet for the protected network, to communicate with each other, through the firewall, using Ping (ICMP)-packets, a Ping-packet returned by said second IC-breaker to said first IC-breaker temporarily opening the firewall for this type of traffic, and said first IC-breaker may be adapted, on receipt of the returned Ping-packet, to send the IP data packet through the opened firewall to the second IC-breaker. The second IC-breaker may be adapted, on receipt of said IP data packet, to send the received packet to the protected network.

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According to a second aspect of the present invention, there is provided, a transmission system, adapted for the transmission of IP data packets, said system including an IP-network and a network protected by a firewall, characterised in that said firewall is adapted to allow a particular type IP-packet to pass through the  
5 firewall to the protected network; IP-traffic to pass through the firewall from the inside thereof to the outside thereof, said IP-traffic opening the firewall for IP-traffic for a limited period of time; and IP-traffic, similar to that which is sent from the inside of the firewall to the outside of the firewall, to be transmitted through the firewall to the protected network during said limited period of time. The particular type of IP-  
10 packet may be a Ping (ICMP)-packet.

The protected network may be a Local Area Network (LAN) and the transmission system may be an Asynchronous Transfer Mode (ATM) transmission system, adapted for the transmission of IP data packets, using ATM as a carrier  
15 network.

According to a third aspect of the present invention, there is provided, in a transmission system, adapted for the transmission of IP data packets, said system including an IP-Network and a network protected by a firewall, a method for the  
20 transmission of IP data packets to the protected network, characterised by opening said firewall for a limited period of time and by transmitting an IP data packet, through the opened firewall, to the protected network.

The method may be characterised by said firewall allowing a particular type  
25 of IP-packet to pass through; and IP-traffic to pass through, from the inside thereof to the outside thereof, said IP-traffic opening the firewall for said limited period of time; and by transmitting said IP data packet to said protected network during said limited period of time, said IP data packet being similar to the IP-traffic which opens the firewall for said limited period of time. The method may be further characterised  
30 by said particular type of IP-packet being a Ping (ICMP)-packet.

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5 The method may be characterised by said system including first and second IC-breakers, located on opposite sides of said firewall, and by said IC-breakers having a structure and functionality dictated by the manner in which said firewall operates. The method may be further characterised by said first IC-breaker being located on the outside of the firewall and said second IC-breaker being located on the inside of the firewall, and by said first IC-breaker receiving and storing IP data packets for the protected network; on receipt of said IP data packet, sending Ping IP-packets to the second IC-breaker through the firewall; awaiting receipt of a return Ping IP-packet from the second IC-breaker, said IP-packet opening the firewall for a short period of time; and sending said stored IP data packet through the open firewall to the second IC-breaker. The method may be further characterised by said second IC-breaker identifying the size of a Ping IP-packet received from said first IC-breaker, said size being indicative of the type of packet which has been received and the port via which it was received; returning the Ping IP-packet to said first IC-breaker, thereby opening the firewall for a limited period of time; awaiting receipt, from said first IC-breaker, of said IP data packet for the protected network, during said limited period of time said firewall is open; and sending the received IP data packet to the protected network.

20 The method may be characterised by said first IC-breaker being located on the IP-network side of the firewall and said second IC-breaker being located on the protected network side of the firewall; said first IC-breaker receiving and storing IP data packets from IP-network equipments that are destined for the protected network; said IC-breakers, on receipt, by said first IC-breaker, of a IP data packet for a protected network, communicating with each other, through the firewall, using Ping (ICMP)-packets, a Ping-packet returned by said second IC-breaker to said first IC-breaker temporarily opening the firewall for this type of traffic; said first IC-breaker, on receipt of the returned Ping-packet, sending the IP data packet through the opened firewall to the second IC-breaker; and said second IC-breaker, on receipt of said IP data packet, sending the received packet to the protected network.

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The method may be characterised in that said protected network is a Local Area Network (LAN).

The method may be characterised in that said system is an Asynchronous Transfer Mode (ATM) transmission system, adapted for the transmission of IP data packets, using ATM as a carrier network.

According to a fourth aspect of the present invention, there is provided, apparatus for providing access to a firewall protected network, characterised in that said arrangement includes means for temporarily opening the firewall to enable IP data packets to be transmitted through the firewall to said protected network. The means for temporarily opening the firewall may include two IC-breakers, located on opposite sides of said firewall, and said firewall may be adapted to allow IP-traffic to be transmitted from the inside thereof to the outside thereof, and communication between said IC-breakers using a Ping service, a response to said Ping service temporarily opening the firewall for the transmission of IP data packets to said protected network.

The IC-breaker, located on the outside of said firewall, may be adapted to store IP data packets destined for the protected network; send Ping IP-packets to the other IC-breaker through the firewall; await receipt of a returned Ping IP-packet from said other IC-breaker, said IP- packet opening the firewall for a limited period of time; and send said stored IP data packet through the open firewall to said other IC-breaker.

The IC-breaker, located on the protected network side of the firewall may be adapted to identify the size of a Ping IP-packet received from a sender located outside the firewall, said size being indicative of the type of packet which has been received and the port via which it was received; return the Ping IP-packet to the sender, which opens the firewall for a limited period of time; await receipt, from the sender, of an IP data packet for the protected network, during said limited period of



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time said firewall is open; and send the received IP data packet to the protected network.

5 A first one of said IC-breakers may be located on the outside of the firewall and a second one of said IC-breaker is located on the protected network side of the firewall, said first IC-breaker may be adapted to receive and store IP data packets destined for the protected network, said IC-breakers may be adapted, on receipt, by said first IC-breaker, of a IP data packet for the protected network, to communicate with each other, through the firewall, using Ping (ICMP)-packets, a Ping-packet returned by said second IC-breaker to said first IC-breaker temporarily opening the firewall for this type of traffic, said first IC-breaker may be adapted, on receipt of the returned Ping-packet, to send the IP data packet through the opened firewall to the second IC-breaker, and said second IC-breaker may be adapted, on receipt of said IP data packet, to send the received packet to the protected network.

10 According to a fifth aspect of the present invention, there is provided, an IC-breaker adapted for use with apparatus as outlined in preceding paragraphs, characterised in that said IC breaker includes means for transmitting PING packets to an IC breaker located behind a firewall, means for storing a received IP packet, means for detecting receipt of an IP packet from within said firewall, and means, operative in response to receipt of an IP packet from within said firewall, to transmit IP stored packets.

15 According to a sixth aspect of the present invention, there is provided, an IC-breaker adapted for use with apparatus as outlined in preceding paragraphs, characterised in that said IC-breaker includes means for identifying a received PING packet and determining an associated IP packet type therefrom, means for transmitting an IP packet of the type associated with the received IP packet through the firewall, means for receiving an IP packet transmitted through said firewall, and means for distributing said IP packet to a predetermined address.

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According to a seventh aspect of the present invention, there is provided, a transmission system, adapted for the transmission of IP data packets, said system including an IP-network and a network protected by a firewall, characterised in that said system includes an apparatus as outlined in preceding paragraphs.

According to an eighth aspect of the present invention, there is provided, a communications system including a transmission system, as outlined in preceding paragraphs, or operating in accordance with a method, as outlined in preceding paragraphs.

The foregoing and other features of the present invention will be better understood from the following description with reference to the single figure of the accompanying drawings which diagrammatically illustrates a transmission system according to the present invention.

The single figure of the accompanying drawings diagrammatically illustrates an example of how a SNMP (Switching Network Management Protocol)-TRAP can be distributed to a remote system which is inside a firewall. TRAP is an SNMP operation. In practice, the IP-plane control entity, on recognizing an IP data flow, may be adapted to generate a SNMP-TRAP with information about the recognized IP data flow and its attributes. An SNMP-TRAP may be used to issue an unconfirmed notification to downstream/upstream nodes of an ATM carrier network and SNMP SET/RESPONSE may be used when confirmation is sought by the transmission system.

As is diagrammatically illustrated in the single figure of the accompanying drawings, a firewall, which is interposed between an IP-Network and a firewall protected network, for example, a Local Area Network (LAN), is adapted to normally block incoming traffic, from an Equipment connected to the IP-Network, to a Remote System connected to a firewall protected network. The IP-Network includes an IC-breaker 1, which is adapted to receive and store an IP data packet from the IP-

Network Equipment and to communicate, in a manner to be subsequently outlined, with an IC-breaker 2. The IC-breaker 2 is adapted to send IP data packets, received from IC-breaker 1, to the Remote System connected to the LAN.

5           The problem with a firewall and other equipment is that it can be very difficult to remotely control systems which are inside the firewall, i.e. the Remote System. An IC-breaker which is adapted to temporarily open the firewall for a special type of traffic, is a functionality that can be either included in an application, or in a separate entity. The transmission system of the present invention includes two IC-breakers,  
10           one of which is inside the firewall and the other one of which is outside the firewall.

          As is diagrammatically illustrated in the single figure of the accompanying drawings, the distribution of traffic from an equipment outside the firewall to a network user inside the firewall is effected through use of IC-breaker 1 in association  
15           with IC-breaker 2. In particular, an IP data packet required to be transmitted from the IP-Network Equipment to the Remote System, is sent by the IP-Network Equipment to the IC-breaker 1. The received IP data packet is stored in the IC-breaker 1. The stored IP data packet is then sent by IC-breaker 1 to IC-breaker 2, which is situated inside the firewall, in a manner according to the present invention.  
20           On receipt of the IP data packet, IC-breaker 2 sends it to the Remote System.

          The IC-breakers have a structure and functionality based on the following properties of the firewall:

- 25           – a 'PING' (Internet Control Message Protocol (ICMP)) packets can always be sent through a firewall;
- IP- traffic can always be transmitted from the inside of a firewall to the outside of the firewall; and
- 30           – if IP-traffic is sent from the inside of a firewall to the outside of the firewall,

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similar IP-traffic can be transmitted to the network protected by the firewall during a limited period of time.

As stated above, the Ping service which, in Windows, can be run on DOS, enables a network equipment to send messages, in the form of data packets, to a computer with which contact is required. If the computer is connected to the network, the computer, on receipt of a Ping packet, sends it back to the network equipment. If the data packet is not returned, the network equipment will know that the computer is not connected to the network.

A method, according to the present invention, for the distribution of a SNMP-TRAP to a network inside a firewall, i.e. the Remote System of the LAN, will now be described with reference to the single figure of the accompanying drawings. The steps of this method, which are illustrated in the single figure of the drawings by the lines numbered 1 to 5, are as follows:

- the IP-Network Equipment sends an IP data packet to IC-breaker 1, as shown by line 1, the data packet being stored in IC-breaker 1;
- on receipt and storage of the IP data packet, IC-breaker 1 sends a series of Ping (ICMP) packets (messages) to IC-breaker 2 (see line 2) - Ping (ICMP) packets can always be sent through a firewall;
- on receipt of the Ping (ICMP) packets, IC-breaker 2 sends an IP data packet back to IC-breaker 2 (see line 3), which opens the firewall temporarily for this kind of traffic - IP-traffic can always be transmitted from the inside of a firewall to the outside of the firewall;
- IC-breaker 1 sends the IP data packet, for the Remote System of the LAN, through the opened firewall to IC-breaker 2 (see line 4); and

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- on receipt of the IP data packet, IC-breaker 2 sends the IP data packets to the Remote System of the LAN, as shown by line 5,

It will be seen from the foregoing description that, in accordance with the present invention an arrangement and method is provided for gaining access to a firewall protected network, i.e. the Remote System of the LAN, and that means are provided for temporarily opening the firewall to enable IP data packets to be transmitted therethrough to the protected network.

In particular, the means for temporarily opening the firewall include two IC-breakers, IC-breaker 1 and IC-breaker 2, located on opposite sides of said firewall, that the functional arrangements for the firewall is such that it allows IP-traffic to be transmitted from the inside thereof to the outside thereof, and communication to be effected between the two IC-breakers using a Ping service, and that a response to the Ping service temporarily opens the firewall for the transmission of IP data packets to the protected network. The IC-breaker functions are shown in the following table:

Arriving IP data packet	Arriving Ping-packets
Send a number of Ping-packets to an IC-breaker inside the firewall; the packet size being indicative of the type of packet which has been received and the port via which it was received.	Identify the packet size of the Ping-packets which indicates the type of IP-packets, associated with the Ping-packets, and a particular port via which it was received.

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Await receipt of an IP-packet from an IC-breaker which pings, i.e. responds to the Ping-packets. The received IP-packet causing the firewall for a short period of time and thereby allow an IP data packet to pass through the firewall, from the outside to the inside.	Send to the IC-breaker, outside the firewall, a packet of the type which has been identified. This will cause the firewall to open for a short period of time.
Send the original IP data packet through the opened firewall to the IC-breaker inside the firewall for onward transmission to the intended recipient at a predetermined address.	Await receipt of an IP data packet from the IC-breaker outside the firewall and, on receipt, send the IP data packet to a predetermined address, for example, a remote computer system.

It will also be seen from the foregoing description that the present invention provides a transmission system, for example, an ATM transmission system, which is adapted for the transmission of IP data packets, and which includes an IP-network, a network protected by a firewall, and means for gaining access to a firewall protected network.

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# CLAIMS

1. A transmission system, adapted for the transmission of IP data packets, said system including an IP-network (IP-NET) and a network (LAN) protected by a firewall, said firewall being adapted to block incoming traffic to the protected network, and devices (IC-BREAKER 1 and IC-BREAKER 2) to open the firewall to enable IP data packets to be transferred through the firewall to the protected network, **characterised in**, that said devices to open the firewall include a first IC-breaker (IC-BREAKER 1) located on the IP-network side of the firewall and a second IC-breaker (IC-BREAKER 2) located on the protected network side of the firewall, that said firewall is transparent to a particular type of IP packets to enable communication between said IC-breakers through the firewall using said particular IP packets, and that said first IC-breaker is adapted to from the IP network equipment receive IP data packets, intended for the protected network (LAN), and that said first IC-breaker is adapted to, on receipt of such a particular IP data packet for the protected network, send said particular IP packet to said second IC-breaker, and besides an IP packet of said particular type, returned by said second IC-breaker to said first IC-breaker, occasionally opens the firewall, at which said first IC-breaker is adapted to, on receipt of a returned IP packet of said particular type, send said received IP data packet through the open firewall to the second IC-breaker, and that said second IC-breaker is adapted, on receipt of said IP data packet, to send the received IP data packet to the protected network.

2. A transmission system, as claimed in claim 1, **characterised in** that said particular type of IP-packet is a Ping (ICMP)-packet.

3. A transmission system, as claimed in claim 1 or claim 2, **characterised in** that said firewall is adapted to be transparent to IP-communication through the firewall from the inside to the outside thereof, and, for a limited period of time, open to IP-communication through the firewall from the outside to the inside thereof.

4. A transmission system, as claimed in any preceding claim, **characterised**

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in that said first IC-breaker (IC-BREAKER 1) is adapted, on receipt of an IP data packet, to store said IP data packet and send said stored IP data packet through the open firewall to the second IC-breaker (IC-BREAKER 2), when the firewall has been the opened.

5. A transmission system, as claimed in any preceding claim, **characterised** in that said second IC-breaker (IC-BREAKER 2) is adapted to identify the size of a Ping IP-packet received from a sender in the form of a IC-breaker said size being indicative of the type of packet, which has been received and the port via which it was received.

6. A transmission system, as claimed in any preceding claim, **characterised** in that said protected network is a Local Area Network (LAN).

7. A transmission system, as claimed in any preceding claim, **characterised** in that said system is an Asynchronous Transfer Mode (ATM) transmission system, adapted for the transmission of IP data packets, using ATM as a carrier network.

8. In a transmission system, adapted for the transmission of IP data packets, said system including an IP-Network (IP-NET) and a network (LAN) protected by a firewall, a method for the transmission of IP data packets to the protected network, said firewall being opened for a limited period of time and IP data packets are transmitted through the opened firewall to the protected network (LAN) **characterised by** a first IC-breaker (IC-BREAKER 1) being located on the outside of the firewall and a second IC-breaker (IC-BREAKER 2) being located on the inside of the firewall, and by

- IP data packets being received and stored by said first IC-breaker;
- on receipt of said IP data packets a particular type of IP-packets are transmitted by said first IC-Breaker to said second IC-breaker through the firewall;
- awaiting receipt of said particular type of IP-packet from said second IC-breaker, said IP-packet opening the firewall for a short period of time; and



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- sending said stored IP data packet through the open firewall to said second IC-breaker.

9. A method, as claimed in claim 8, **characterised by** said particular type of IP-packet being a Ping (ICMP)-packet.

10. A method, as claimed in claim 9, **characterised by**:

- the size of a Ping IP-packet received from said first IC-breaker (IC-Breaker 1), being identified by said second IC-breaker (IC-Breaker 2), said size being indicative of the type of packets which have been received and the port via which it was received;
- ping IP-packet being returned to said first IC-breaker (IC-Breaker 1) by said second IC-breaker (IC-Breaker 2), thereby opening the firewall for a limited period of time;
- said second IC-breaker (IC-Breaker 2) awaiting receipt, from said first IC-breaker, of said IP data packet for the protected network, during said limited period of time said firewall is open; and
- said second IC-breaker (IC-Breaker 2) sending the received IP data packet to the protected network.

11. A method, as claimed in any of claims 8 to 10, **characterised in** that said protected network is a Local Area Network (LAN).

12. A method, as claimed in any of claims 8 to 11, **characterised in** that said system is an Asynchronous Transfer Mode (ATM) transmission system, adapted for the transmission of IP data packets, using ATM as a carrier network.

13. Apparatus for providing access to a firewall protected network, including means for temporarily opening the firewall to enable IP data packets to be transmitted through the firewall to said protected network (LAN) **characterised in** that said means for temporarily opening the firewall include two IC-breakers, (IC-breaker 1 and IC-breaker 2) located on opposite sides of said firewall, and in that said firewall is adapted to allow IP-traffic from one side thereof the other side and

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communication between said IC-breakers using a Ping service, a response to said Ping service temporarily opening the firewall for the transmission of IP data packets to said protected network (LAN).

14. Apparatus as claimed in claim 13, **characterised in** that the IC-breaker, located on the outside of said firewall, is adapted to:

- store IP data packets destined for the protected network (LAN);
- send Ping IP-packets to the other IC-breaker through the firewall;
- await receipt of a returned Ping IP-packet from said other IC-breaker, said returned IP-packet opening the firewall for a limited period of time; and
- send said stored IP data packets through the open firewall to said other IC-breaker.

15. Apparatus, as claimed in either claim 13, or claim 14, **characterised in** that the IC-breaker (IC-BREAKER 2), located on the protected network side of the firewall is adapted to:

- identify the size of a Ping IP-packet, received from a sender in the form of a IC-breaker, located outside the firewall, said size being indicative of the type of packet which has been received and the port via which it was received;
- return the Ping IP-packet to the sender, which opens the firewall for a limited period of time;
- await receipt, from the sender, of said IP data packet for the protected network during said limited period of time said firewall is open; and
- send the received IP data packets to the protected network.

16. Apparatus, as claimed in claim 13, **characterised in** that the first one of said IC-breakers (IC-BREAKER 1) is located on the outside of the firewall and that the second one of said IC-breakers (IC-BREAKER 2) is located on the protected network side (LAN) of the firewall, in that said first IC-breaker is adapted to receive and store IP data packets destined for the protected network, in that said IC-breakers are adapted, on receipt, by said first IC-breaker, of a IP data packet for the protected network, to communicate with each other, through

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the firewall, using Ping (ICMP)-packets, a Ping-packet returned by said second IC-breaker to said first IC-breaker temporarily opening the firewall for this type of traffic, in that said first IC-breaker (IC-BREAKER 1) is adapted, on receipt of the returned Ping-packet, to send IP data packets through the opened firewall to the second IC-breaker (IC-BREAKER 2), and in that said second IC-breaker is adapted, on receipt of said IP data packet, to send the received packets to the protected network.

17. An IC-breaker adapted for use with apparatus as claimed in any of claims 13 to 16, **characterised in** that said IC-breaker includes means for transmitting PING packets to an IC-breaker, located behind a firewall, means for storing a received IP packets, means for detecting receipt of said IP packets from within said firewall, and means, operative in response to receipt of IP packets to transmit stored IP packets.

18. An IC-breaker adapted for use with apparatus as claimed in any of claims 13 to 16, **characterised in** that said IC-breaker includes means for identifying a received PING packet and determining an associated IP packet type therefrom, means for transmitting an IP packets of said associated IP packet type through the firewall, means for receiving an IP packet transmitted through said firewall, and means for distributing said IP packet to a predetermined address.

19. A transmission system, adapted for the transmission of IP data packets, said system including an IP-network (LAN) protected by a firewall, **characterised in** that said system includes an apparatus as claimed in any of claims 13 to 16.

20. A communications system including a transmission system as claimed in any of claims 1 to 7 or claim 19, or operating in accordance with a method as claimed in any of claims 8 to 12.

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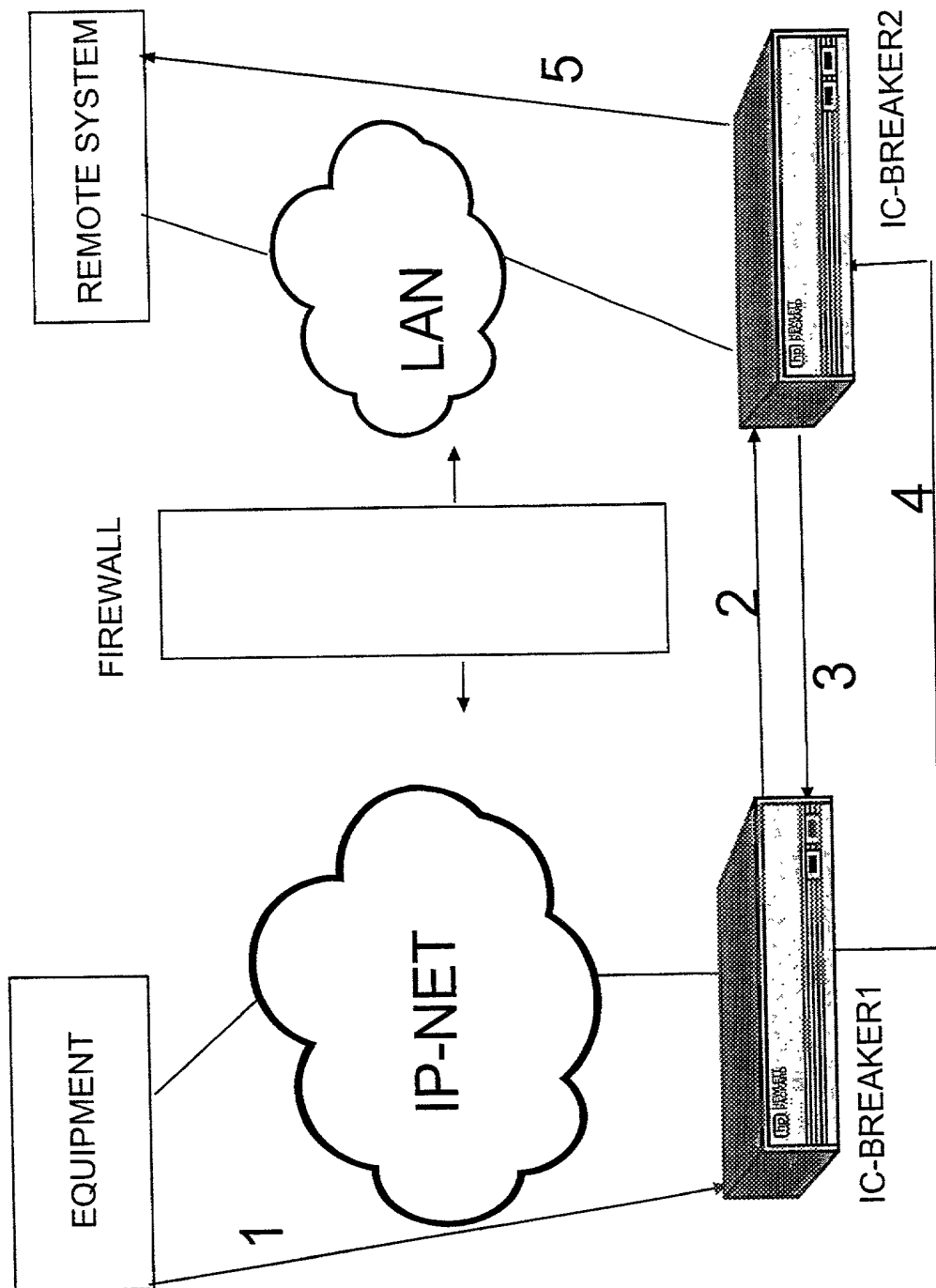


FIG 1

Rec'd PCT/PTO 20 AUG 2000

## Declaration, Power Of Attorney and Petition

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WE (I) the undersigned inventor(s), hereby declare(s) that:

My residence, post office address and citizenship are as stated below next to my name,

We (I) believe that we are (I am) the original, first, and joint (sole) inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled

A TRANSMISSION SYSTEM, A METHOD AND AN APPARATUS PROVIDING ACCESS FOR IP DATA  
PACKETS TO A FIREWALL PROTECTED NETWORK (AS AMENDED)

the specification of which

☐ is attached hereto.

☐ was filed on \_\_\_\_\_ as

Application Serial No. \_\_\_\_\_

and amended on \_\_\_\_\_.

☒ was filed as PCT international application

Number PCT/SE99/01561

on September 08, 1999,

and was amended under PCT Article 19

on \_\_\_\_\_ (if applicable).

We (I) hereby state that we (I) have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We (I) acknowledge the duty to disclose information known to be material to the patentability of this application as defined in Section 1.56 of Title 37 Code of Federal Regulations.

We (I) hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed. Prior Foreign Application(s)

Application No.	Country	Day/Month/Year	Priority Claimed
<u>9803125-5</u>	<u>SWEDEN</u>	<u>11 September 1998</u>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No
_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No
_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No

We (I) hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

_____ (Application Number)	_____ (Filing Date)
_____ (Application Number)	_____ (Filing Date)

We (I) hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or under § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

Application Serial No.	Filing Date	Status (pending, patented, abandoned)
PCT/SE99/01561	08 September 1999	
_____	_____	_____
_____	_____	_____

And we (I) hereby appoint the following registered practitioner(s):



**022850**

as our (my) attorneys, with full powers of substitution and revocation, to prosecute this application and to transact all business in the Patent Office connected therewith; and we (I) hereby request that all correspondence regarding this application be sent to



**022850**

We (I) declare that all statements made herein of our (my) own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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